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PATENT APPLICATION/PCT  
Attorney's Docket No. 388-011672

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of :  
**Takahiro YAMAGISHI** : **METHOD OF IMAGING**  
**and Shigeki TAMURA** : **LIQUID-FILLING CONTAINER**  
: **AND APPARATUS THEREFOR**  
International Application :  
No. PCT/JP01/00729 :  
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Pittsburgh, Pennsylvania  
October 3, 2001

**PRELIMINARY AMENDMENT**

**BOX PCT**  
Commissioner for Patents  
Washington DC 20231

Sir:

Prior to initial examination, please amend the above-identified patent application  
as follows:

**IN THE SPECIFICATION:**

Please insert and amend section headings and paragraphs as follows.  
(Pursuant to 37 CFR 1.121, a marked-up version of the amended specification headings  
and paragraphs is attached.)

On page 1, line 1, please delete the word "SPECIFICATION".

On page 1, line 5, please insert the following section heading:

**BACKGROUND OF THE INVENTION**

On page 1, line 6, please amend the section heading "TECHNICAL FIELD" to read as follows:

**1. Field of the Invention**

On page 1, line 16, please amend the section heading "BACKGROUND ART" to read as follows:

**2. Description of the Prior Art**

On page 3, line 22, please amend the section heading "DISCLOSURE OF THE INVENTION" to read as follows:

**SUMMARY OF THE INVENTION**

On page 3, please delete the paragraph bridging pages 3 and 4 and insert the following replacement paragraph:

For accomplishing the above object, according to the present invention, as shown in Figs. 1 and 2 for example, in the method or the apparatus for imaging a liquid-filling container, there are provided a light emitting unit 2 and a light receiving unit 3. The light emitting unit 2 emits and irradiates light onto the container B and the light receiving unit 3 receives the light transmitted through the container for imaging thereof. The light emitting unit 2 emits and irradiates a near infrared light as said light for imaging the container B.

On page 5, please delete the first complete paragraph and insert the following replacement paragraph:

According to the present invention, the light emitting unit 2 comprises a light emitter 2A and a cut filter 5 for filtering light from the light emitter 2A so as to transmit only near infrared light component of the light or a greater amount of near infrared light component than visible light component of the light.

**On page 5, please delete the third complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown in Figs. 1 and 2 for example, in the method or the apparatus for imaging a liquid-filling container, there are provided a light emitting unit 2 and a light receiving unit 3. The light emitting unit 2 emits and irradiates light onto the container B and the light receiving unit 3 receives the light transmitted through the container for imaging thereof. The light receiving unit 3 receives a near infrared light as said light for imaging the container B.

**On page 6, please delete the second complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown in Fig. 2 for example, the light receiving unit 3 comprises a cut filter 5 for filtering the light transmitted through the container so as to transmit only near infrared component of the light or a greater amount of near infrared light component than visible light component of the light and a light receiver 3A for receiving the light transmitted through the cut filter 5.

**On page 7, please delete the first complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown in Figs. 1 and 2 for example, the light emitting unit 2 and the light receiving unit 3 are disposed so as to enable imaging of a container B which is conveyed one after another along a conveying line 1.

**On page 7, please delete the third complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown in Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting an amount of liquid W filled in the container B.

**On page 7, please delete the paragraph bridging pages 7 and 8 and insert the following replacement paragraph:**

With this characterizing feature, the method or the apparatus according to the present invention detects an amount of liquid filled in the container. Then, the detection for the area corresponding to this container of the liquid surface level is made possible. As a result, the detection of the liquid level can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**On page 8, please delete the first complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting any foreign substance present in the liquid filled in the container.

**On page 8, please delete the second complete paragraph and insert the following replacement paragraph:**

With this characterizing feature, the method or the apparatus according to the present invention detects any foreign substance present in the liquid filled in the container. Then, the detection for the area corresponding to this container of the foreign substance mixed in the liquid is made possible. As a result, the detection of the foreign substance mixed in

the liquid can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**On page 8, please delete the third complete paragraph and insert the following replacement paragraph:**

According to the present invention, as shown in Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting any foreign substance present in the container B or in a material forming the container B.

**On page 8, please delete the fourth complete paragraph and insert the following replacement paragraph:**

With this characterizing feature, the method or the apparatus according to the present invention detects any foreign substance present in the container or in a material forming the container. Then, the detection for the area corresponding to this container of the foreign substance mixed in the container material is made possible. As a result, the detection of the foreign substance mixed in the container material can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**On page 9, line 16 please amend the section heading "BEST MODE OF EMBODYING THE INVENTION" to read as follows:**

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**IN THE CLAIMS:**

**Please cancel the previous version of claims 1-16 and rewrite the claims as claims 17-40 as follows:**

17. A method of imaging a liquid-filling container, comprising the steps of:  
emitting and irradiating light onto the container by a light emitting unit,  
receiving the light transmitted through the container by a light receiving unit, and  
imaging the container based on information about the transmitted light,  
wherein said light emitting unit emits and irradiates a near infrared light as said  
light for imaging the container.

18. The method according to claim 17, wherein said light emitting unit  
comprises a light emitter and a cut filter for filtering light from the light emitter so as to  
transmit only near infrared light component of the light or a greater amount of near infrared  
light component than visible light component of the light.

19. A method of imaging a liquid-filling container, comprising the steps of:  
emitting and irradiating light onto the container by a light emitting unit,  
receiving the light transmitted through the container by a light receiving unit, and  
imaging the container based on information about the transmitted light,  
wherein said light receiving unit receives a near infrared light as said light for  
imaging the container.

20. The method according to claim 19, wherein said light receiving unit  
comprises a cut filter for filtering the light transmitted through the containers so as to  
selectively transmit only near infrared component of the light or a greater amount of near  
infrared light component than visible light component of the light and a light receiver for  
receiving the light transmitted through the cut filter.

21. The method according to claim 17, wherein said light emitting unit and said light receiving unit are disposed so as to enable imaging of a container which are conveyed one after another along a conveying line.

22. The method according to claim 17, further including the step of detecting an amount of liquid filled in the container.

23. The method according to claim 17, further including the step of detecting any foreign substance present in the liquid filled in the container.

24. The method according to claim 17, further including the step of detecting any foreign substance present in the container or in a material forming the container.

25. An apparatus for imaging a liquid-filling container, comprising:  
a light emitting unit for emitting and irradiating light onto the container, and  
a light receiving unit for receiving the light transmitted through the container,  
wherein said light emitting unit emits and irradiates a near infrared light as said light for imaging the container.

26. The apparatus according to claim 25, wherein said light emitting unit comprises a light emitter and a cut filter for filtering light from the light emitter so as to transmit only near infrared component of the light or a greater amount of near infrared light component of the light than visible light component thereof.

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27. An apparatus for imaging a liquid-filling container, comprising:  
a light emitting unit for emitting and irradiating light onto the container, and  
a light receiving unit for receiving the light transmitted through the container,  
wherein said light receiving unit receives a near infrared light as said light for  
imaging the container.

28. The apparatus according to claim 27, wherein said light receiving unit  
comprises a cut filter for filtering the light transmitted through the container so as to transmit  
only near infrared component of the light or a greater amount of near infrared light  
component than visible light component of the light and a light receiver for receiving the light  
transmitted through the cut filter.

29. The apparatus according to claim 25, wherein said light emitting unit and  
said light receiving unit are disposed so as to enable imaging of said container which is  
conveyed one after another along a conveying line.

30. The apparatus according to claim 25, wherein an amount of liquid filled in  
the container is detected.

31. The apparatus according to claim 25, wherein any foreign substance present  
in the liquid filled in the container is detected.

32. The apparatus according to claim 25, wherein any foreign substance present  
in the container or in a material forming the container is detected.



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33. The method according to claim 19, wherein said light emitting unit and said light receiving unit are disposed so as to enable imaging of a container which are conveyed one after another along a conveying line.

34. The method according to claim 19, further including the step of detecting an amount of liquid filled in the container.

35. The method according to claim 19, further including the step of detecting any foreign substance present in the liquid filled in the container.

36. The method according to claim 19, further including the step of detecting any foreign substance present in the container or in a material forming the container.

37. The apparatus according to claim 27, wherein said light emitting unit and said light receiving unit are disposed so as to enable imaging of said container which is conveyed one after another along a conveying line.

38. The apparatus according to claim 27, wherein an amount of liquid filled in the container is detected.

39. The apparatus according to claim 27, wherein any foreign substance present in the liquid filled in the container is detected.

40. The apparatus according to claim 27, wherein any foreign substance present in the container or in a material forming the container is detected.

**IN THE ABSTRACT:**

Please cancel the previous version of the ABSTRACT and insert the amended version as follows. (Pursuant to 37 CFR 1.21, a marked-up version of the Abstract of The Disclosure is attached.)

**ABSTRACT OF THE DISCLOSURE**

The present invention is a method and an apparatus for imaging a liquid-filling container in which a light emitting unit is provided for emitting and irradiating light onto the container and a light receiving unit is provided for receiving the light transmitted through the container. The object of the present invention is to provide such a method and an apparatus for imaging a liquid-filling container. This method and apparatus assures reliable detection of the surface of liquid filled in a container or of foreign substance mixed in the liquid or present in the container or the container material not only when the container is transparent, but also when the container is a colored container of a dark color such as black, dark green or dark brown or the container has a frosted surface of when the liquid filled in the container has a dark color. For accomplishing this object, according to the present invention, the light emitting unit emits near infrared light or the light receiving unit receives near infrared light for imaging the container.

**REMARKS**

The specification has been amended to conform the application standard United States patent practice.

Claims 1-16 have been canceled and rewritten as claims 17-40 in order to eliminate the multiple dependencies and to eliminate the reference numerals.

The Abstract also has been amended to remove the reference numerals.

Examination and allowance of claims 17-40 are respectfully requested.

Respectfully submitted,

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**MARKED-UP AMENDED SPECIFICATION HEADINGS**

**Page 1, line 6 section heading**

[TECHNICAL FIELD]

**1. Field of the Invention**

**Page 1, line 16 section heading**

[BACKGROUND ART]

**2. Description of the Prior Art**

**Page 3, line 22 section heading**

[DISCLOSURE OF THE INVENTION]

**SUMMARY OF THE INVENTION**

**Page 3, paragraph bridging pages 3 and 4**

For accomplishing the above object, according to the [characterizing feature relating to claims 1 and 9] present invention, as shown in Figs. 1 and 2 for example, in the method or the apparatus for imaging a liquid-filling container, there are provided a light emitting unit 2 and a light receiving unit 3. The light emitting unit 2 emits and irradiates light onto the container B and the light receiving unit 3 receives the light transmitted through the container for imaging thereof. The light emitting unit 2 emits and irradiates a near infrared light as said light for imaging the container B.

**Page 5, first complete paragraph**

According to the [characterizing feature relating to claims 2 and 10] present invention, the light emitting unit 2 comprises a light emitter 2A and a cut filter 5 for filtering light from the light emitter 2A so as to transmit only near infrared light component of the light or a greater amount of near infrared light component than visible light component of the light.

**Page 5, third complete paragraph**

According to the [characterizing feature relating to claims 3 and 11] present invention, as shown in Figs. 1 and 2 for example, in the method or the apparatus for imaging a liquid-filling container, there are provided a light emitting unit 2 and a light receiving unit 3. The light emitting unit 2 emits and irradiates light onto the container B and the light receiving unit 3 receives the light transmitted through the container for imaging thereof. The light receiving unit 3 receives a near infrared light as said light for imaging the container B.

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**Page 6, second complete paragraph**

According to the [characterizing feature relating to claims 4 and 12] present invention, as shown in Fig. 2 for example, the light receiving unit 3 comprises a cut filter 5 for filtering the light transmitted through the container so as to transmit only near infrared component of the light or a greater amount of near infrared light component than visible light component of the light and a light receiver 3A for receiving the light transmitted through the cut filter 5.

**Page 7, first complete paragraph**

According to the [characterizing feature relating to claims 5 and 13] present invention, as shown in Figs. 1 and 2 for example, the light emitting unit 2 and the light receiving unit 3 are disposed so as to enable imaging of a container B which is conveyed one after another along a conveying line 1.

**Page 7, third complete paragraph**

According to the [characterizing feature relating to claims 6 and 14] present invention, as shown in Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting an amount of liquid W filled in the container B[, which comprises the method according to any one of claims 1-5. or the apparatus according to any one of claims 9-13].

**Page 7, paragraph bridging pages 7 and 8**

With this characterizing feature, the method [according to any one of claims 1-5] or the apparatus according to [any one of claims 9-13] the present invention detects an amount of liquid filled in the container. Then, the detection for the area corresponding to this container of the liquid surface level is made possible. As a result, the detection of the liquid level can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**Page 8, first complete paragraph**

According to the [characterizing feature relating to claims 7 and 15] present invention, as shown Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting any foreign substance present in the liquid filled in the container[, which comprises the method according to any one of claims 1-5 or the apparatus according to any one of claims 9-13].

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**Page 8, second complete paragraph**

With this characterizing feature, the method [according to any one of claims 1-5] or the apparatus according to [any one of claims 9-13] the present invention detects any foreign substance present in the liquid filled in the container. Then, the detection for the area corresponding to this container of the foreign substance mixed in the liquid is made possible. As a result, the detection of the foreign substance mixed in the liquid can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**Page 8, third complete paragraph**

According to the [characterizing feature relating to claims 8 and 16] present invention, as shown in Figs. 1 and 2 for example, there is provided a method or an apparatus for detecting any foreign substance present in the container B or in a material forming the container B[, which comprises the method according to any one of claims 1-5 or the apparatus according to any one of claims 9-13].

**Page 8, fourth complete paragraph**

With this characterizing feature, the method [according to any one of claims 1-5] or the apparatus according to [any one of claims 9-13] the present invention detects any foreign substance present in the container or in a material forming the container. Then, the detection for the area corresponding to this container of the foreign substance mixed in the container material is made possible. As a result, the detection of the foreign substance mixed in the container material can be effected reliably, regardless of the color of the container or the color of the liquid or regardless of presence/absence of bubbles near the liquid surface.

**Page 9, line 16 section heading**

[BEST MODE OF EMBODYING THE INVENTION]

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**MARKED-UP VERSION OF ABSTRACT**

[ABSTRACT]

**ABSTRACT OF THE DISCLOSURE**

The present invention [relates to] is a method and an apparatus for imaging a liquid-filling container in which a light emitting unit [(2)] is provided for emitting and irradiating light onto the container [(B)] and a light receiving unit [(3)] is provided for receiving the light transmitted through the container. The object of the present invention is to provide such a method and an apparatus for imaging a liquid-filling container, [which] This method and apparatus [assure] assures reliable detection of the surface of liquid filled in a container or of foreign substance mixed in the liquid or present in the container or the container material not only when the container is transparent, but also when the container is a colored container of a dark color such as black, dark green or dark brown or the container has a frosted surface or when the liquid filled in the container has a dark color. For accomplishing this object, according to the present invention, the light emitting unit [(2)] emits near infrared light or the light receiving unit [(3)] receives near infrared light for imaging the container [(B)].

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